

**Sea Surface and atmospheric fCO<sub>2</sub> data in the South Indian and Southern Oceans  
during OISO-4 cruise onboard the R.V. Marion Dufresne (IPEV)  
January-February 2000**

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## **Method**

The sea surface fugacity of CO<sub>2</sub> (fCO<sub>2</sub>) was measured continuously onboard the R.S.S. Marion-Dufresne (IPEV/TAAF) during the cruise OISO-4 in January-February 2000. The fCO<sub>2</sub> measurements technique has been described previously in details for other cruises conducted during years 1990-1995 in the Indian and Southern Ocean (Poisson *et al.*, 1993; Metzl *et al.* 1995, 1999). This instrumentation was also used by our group during the international at-sea intercomparison of fCO<sub>2</sub> systems conducted in 1996 in the North-Atlantic (Kortzinger *et al.*, 2000; [http://cdiac.ornl.gov/oceans/ndp\\_067/ndp067.html](http://cdiac.ornl.gov/oceans/ndp_067/ndp067.html)).

In short, sea surface water is continuously equilibrated using a "thin film" type equilibrator thermostated with surface seawater. The CO<sub>2</sub> in the dried gas is measured with a non-dispersive infrared analyser (NDIR, Siemens Ultramat 5F). Standard gases for calibration (270.1, 349.9, 489.9 ppm during OISO-4) and atmospheric CO<sub>2</sub> are measured every 7 hours. To correct measurements to in-situ data, we used polynomials given by Weiss and Price (1980) for vapour pressure and by Copin-Montégut (1988, 1989) for temperature. On average, the temperature in the thermostated equilibrium cell was about 0.7°C warmer than SST during OISO-4 cruise (0.2°C in warm waters, up to 2°C in cold waters). Sea surface temperature and salinity recorded with the thermosalinographer were compared (and eventually corrected) to temperature and salinity recorded in surface water during CTD casts. Recorded surface salinity was also compared (and eventually corrected) to sea surface samples measured back to laboratory (Guildline Autosol 8400B). Based on different cruises analysis, the oceanic fCO<sub>2</sub> data are accurate to about ± 0.7 µatm to ± 1.2 µatm (this depends mainly on the precision of temperature probes). The fCO<sub>2</sub> measurements presented in this data-set correspond to 5 minutes average (about 30 records).

The data obtained during OISO-4 cruise have been included in several reports and publications for regional scale analysis (e.g. Jabaud-Jan *et al.*, 2004; Le Quéré and Metzl, 2003; Metzl *et al.* 2001, 2005). Such data-set could be used for constructing global scale pCO<sub>2</sub> climatologies (Takahashi *et al.*, 2002), and for comparing and/or validating ocean models (e.g. international OCMIP/IGBP and european NOCES projects).

## **Files descriptions**

The file **oiso4CO2WAT** contains all the results of sea surface fCO<sub>2</sub> measurements (and associated properties) made onboard during the cruise OISO-4. The columns of the file include: Date (dd/mm/yy), Hour (hh:mn), Latitude (degree.degree), Longitude (degree.degree), atmospheric pressure (mb), sea surface water fCO<sub>2</sub> fugacity (µatm) normalized at 1atm, fCO<sub>2</sub> (1013), and at local pressure, fCO<sub>2</sub> (Patm), fluorescence (in relative units), temperature in the equilibrium cell (°C), sea surface temperature (°C), sea surface salinity, ship speed (knts), ship cap (degree). In addition, last three columns include

temperature (SSTsb5, SSTsb5) and salinity (SSSsb5) recorded with different probes; they present better stability (especially for salinity) and we thus suggest to use SSTsb5 and SSSsb5. The first date (first line) of the dataset, is 15/01/2000 at 14:00 TU. The last line of the dataset is 07/02/2000 at 16:11 TU.

The file **oiso4CO2AIR** contains all the results of atmospheric CO<sub>2</sub> concentrations (and associated properties) made onboard during the cruise OISO-4. The columns of the file include: Date (dd/mm/yy), Hour (hh:mn), Latitude (degree.degree), Longitude (degree.degree), atmospheric molar fraction xCO<sub>2</sub> (ppm), atmospheric pressure (mb), sea surface temperature (°C) and sea surface salinity. The first date (first line) of the dataset, is 15/01/2000 at 19:46 TU. The last line of the dataset is 07/02/2000 at 16:42 TU.

More informations concerning the OISO program (Océan Indien Service d'Observations) can be found on the web site <http://ipsl.jussieu.fr/>. If you have questions concerning these data sets, please contact N.Metzl ([metzl@ccr.jussieu.fr](mailto:metzl@ccr.jussieu.fr))

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